Soft Computing-based Methods for Semantic Service Retrieval

Supannada Chotipant

FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY
UNIVERSITY OF TECHNOLOGY SYDNEY

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CERTIFICATE OF ORIGINAL AUTHORSHIP

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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ABSTRACT

Nowadays, a large number of business services have been advertised to customers via online channels. To access the published services, the customers typically search for the services by using search engines. Consequently, in order to meet the customers' desires, many researchers have focused on improving performance of the retrieval process. In the recent past, semantic technologies have played an important role in service retrieval and service querying. A service retrieval system consists of two main processes; service annotation and service querying. Annotating services semantically enables machines to understand the purpose of services, while semantic service querying helps machines to expand user queries by considering meanings of query terms, and retrieve services which are relevant to the queries. Because of dealing with semantics of services and queries, both processes can further assist in intelligent and precise service retrieval, selection and composition. In terms of semantic service annotation, a key issue is the manual nature of service annotation. Manual service annotation requires not just large amount of time, but updating the annotation is infrequent and, hence, annotation of the service description changes may be out-of-date. Although some researchers have studied semantic service annotation, they have focused only on Web services, not business service information. Moreover, their approaches are semi-automated, so service providers are still required to select appropriate service annotations. Similar to semantic service annotation, existing literature in semantic service querying has focused on processing Web pages or Web services, not business service information. In addition, because of issues of ubiquity, heterogeneity, and ambiguity of services, the use of soft computing methods offers an interesting solution for handling complex tasks in service retrieval. Unfortunately, based on the literature review, no soft-computing based methods have been used for semantic service annotation or semantic service querying. In this research, intelligent soft-computing driven methods are developed to improve the performance of a semantic retrieval system for business services. The research includes three main parts, namely, intelligent methods for semantically annotating services, querying service concepts, and retrieving services based on relevant concepts. Furthermore, a prototype of a service

retrieval system is built to validate the developed intelligent methods. The research proposes three semantic-based methods; ECBR, Vector-based and Classification-based, for accomplishing each research part. The experimental results present that the Classification-based method, which is based on soft-computing techniques, performs well in the service annotation and outperforms both the ECBR and the Vector-based methods in the service querying and service retrieval.

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1. Chotipant, S., Hussain, F.K., Dong, H. & Hussain, O.K. 2014, 'A Fuzzy VSM-Based Approach for Semantic Service Retrieval', *Neural Information Processing: 21st International Conference, ICONIP 2014, Kuching, Malaysia, November 3-6, 2014. Proceedings, Part III*, Springer International Publishing, Cham, pp. 682-9.

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